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ABSTRACT

Approximately 1800 prospective secondary school teachers at Illinois State University are providing themselves with pre-service education via a self-paced competency-based teacher education program. Called the Professional Sequence (PS), the program replaces courses taught by the lecture method. PS frees students from scheduled classes, eliminates non-essential material, and gives continuous evaluations. The program was developed by selecting the desired competencies and designing self-instructional learning packages consisting of: 1) a proficiency test, 2) a statement of objectives, 3) required and optional learning activities, such as reading, or using tapes or computer-assisted instructional programs, and 4) evaluation. Subject matter is increasingly being prepared for a random-access information retrieval system known as the Program Yielding Rapid Access Major Information Devices (PYRAMID). PYRAMID consists of a series of audio and visual storage and playback systems and a mini-computer control unit. The computerized Surveillance System keeps a master file on each student, recording his completion of learning package activities, evaluating what he has learned, and providing daily and weekly printouts on each individual's progress. Weekly meetings between a student and his advisor allow professors to monitor student progress and provide help as needed. (PB)

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INCREASED LEARNING FREEDOM VIA COMPUTERS

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INCREASED LEARNING FREEDOM VIA COMPUTERS

At Illinois State University approximately 1800 prospective secondary school teachers are currently providing themselves with a pre-service education via a self-paced, competency-based teacher education program. The program, known as the Professional Sequence, is one of the largest operational programs of its kind in the country, and the fact that it is operational and is enabling close to two thousand undergraduates to learn at their own individual rates is due, in large part, to the extensive utilization of computers.

BACKGROUND

Prior to the development of the Professional Sequence the education courses required of prospective secondary school teachers included American Public Education, Secondary School Reading, Secondary Education, and Educational Psychology. These courses were taught in the traditional manner wherein students (Juniors and Seniors) were expected to attend scheduled classes, take notes, complete papers and/or projects, and take examinations.

When a growing dissatisfaction on the part of both students and faculty prompted a decision to innovate the existing program it was decided to develop a new program which would not only free students from scheduled classes, but which would also eliminate non-essential and/or duplicated course content, provide meaningful and unbiased evaluations, provide continual results of learning progress, and most importantly, do all of these things while at the same time enabling each student to progress at a rate commensurate with his or her own abilities.

PROGRAM DEVELOPMENT

A number of alternate proposals were studied before the decision was made to build a self-paced, competency-based program similar in design to those in use at Brigham Young University and Weber State University.

The first step in building the new program was determining exactly which competencies students should be expected to acquire. This task was accomplished by culling the most important objectives from each of the existing courses, polling teachers and administrators in the field, and getting input from students and faculty at the university.

The second step involved developing a means by which students could be helped to achieve the stated objectives without being required to attend classes. It was decided that self-instructional "learning packages," similar to those in use at Brighman Young and Weber State, would best meet the needs of students and faculty. It is the compilation of all of the self-instructional packages (each of which written by either a faculty member or a student) in a booklet entitled The Professional Sequence Guide, that is the heart of the Professional Sequence program.

The format of each of the original self-instructional packages was as follows: (1) Proficiency Test--where applicable; (2) Precise Instructional Objective(s)--told the student exactly what was expected of him; (3) Questions To Be Answered--helped the student to focus upon important concepts and/or points; (4) Required Learning Activities--explained how the necessary information and/or skills were to be acquired and included activities such as reading material in self-contained packages, reading material on reserve in the central library or in dormitory libraries, using the Pyramid system (more information later), using CAI programs (more information later), using and audio-visual laboratory, and participating in simulated teaching sessions; (5) Optional Learning Activities--provided alternate modes of

instruction and/or sources of more detailed information concerning particular topics; and (6) Evaluation-- told the student exactly how and where to demonstrate achievement of the objective(s).

During the two years the Professional Seuqence has been in operation the format of the packages has changed slightly. A short Rationale has been added as the first section, and the Questions To Be Answered has been combined with a section called Pre-Assessment. The new Pre-Assessment section enables the student to determine whether he already possesses the required competence, and if not, to then focus his attention upon those areas with which he is least familiar.

Each of the self-instructional packages carries with it a pre-determined number of "merits" based on the number of clock hours students need to complete it. At first this number was simply estimated, however, it is now based on actual averages provided by one of a number of computer programs written to analyze the Professional Sequence (more information later). In addition, each package is designated as being either (1) required prior to Student Teaching, (2) required prior to completion of the program, or (3) optional. At present approximately seventy percent of the packages are required.

THE PYRAMID SYSTEM

Although much of the subject matter of the Professional Sequence is presented via self-contained packages or library readings, an increasing amount is being prepared for use on the random-access information retrieval system known as the Pyramid system.

The Pyramid system (Program Yielding Rapid Access Major Information Devices) consists of a series of audio and visual storage and playback systems (built by Ampex), and a 12K Nova mini-computer control unit (built by Data General).

Together, the storage and playback systems and the Nova controller represent a university investment of almost a quarter of a million dollars.

Using the Pyramid system a student can sit at a carral, call up any of about fifty audio tape or tape-slide programs (via a touch-tone control pad), have the program reproduced at high-speed, have the reproduced program transferred to a playback unit which is completely under his own control, and then use the program for as long as is necessary. The high-speed program reproduction and control transfer takes about forty-five seconds after which the program is again available for use by other students.

The fact that the Pyramid system can store and reproduce both audio and visual materials ideally suits it for use in the Professional Sequence since an effort is being made to reduce student dependency upon the written word as a means of information acquisition. The additional facts that students can call up programs at their own convenience and can use each program for as long as necessary greatly facilitates the self-pacing feature of the Professional Sequence.

At the present time only eighteen of the thirty carrals in the system are tied to the storage and reproduction units. The remaining twelve carrals are being used to retrieve programs stored on video-tapes, however, these units are not under student control. As additional storage and playback units become available, and as additional core storage for the Nova controller is purchased, more carrals will be tied into the system.

The Nova mini-computer provides a number of services. Its primary responsibility is controlling the software and hardware of the Pyramid system. In addition, the Nova also stores, and periodically prints out, program utilization data including the social security number of each user, the program called up by each user, and the length of time the program was used by each user.

A third service provided by the mini-computer is the processing of CAI programs. This application of the Nova is rather limited owing both to the limited storage capacity of the computer and to the existing time-sharing system connecting the I.S.U. campus with the University of Illinois campus at Urbana. Nevertheless, the Nova has been used to process CAI programs including one dealing with the writing of precise instructional objectives and has thereby given at least some students experience with computer assisted instruction.

THE SURVEILLANCE SYSTEM

One of the very first things a student does upon registering for the Professional Sequence is to have a master file created for himself in the computerized record keeping system known as the Surveillance system. At present the student creates this master file by providing the requisite data via a mark-sensing form, however, plans are underway to take the necessary information directly from the registration computer tape. (University records and Professional Sequence records are both processed on the main university computer, an IBM 360/50 512K computer.)

Once the student's master file is in the Surveillance system he begins working on self-instructional packages. As each package is completed the student is required to demonstrate achievement of the objective(s). The competency test can take a variety of forms including objective tests, written tests, papers, simulated teaching evaluation forms, checklists, and specially arranged projects. If the competence is to be demonstrated via an objective test (all of which have an 80% minimum acceptable standard) the student reports to a testing center (at his own convenience) and takes the test using a mark-sensing form to record his name, his social security number, the package number, the number of hours spent on the package, his assessment of the value of each of the learning activities, and his answers. If the competence

is demonstrated in a way other than an objective test the student completes a mark-sensing form with the paper, checklist, etc., is sent to a faculty member for evaluation. The faculty member determines whether the competence has been demonstrated and codes the mark-sensing form either pass or fail. The completed form then joins the objective test answer sheets for processing.

The processing of the mark-sensing forms includes grading tests (when necessary), converting all data to punched card format, and generating a printout (student's social security number, package attempted, whether it was passed or "recycled," and both the stated criterion level and the actual score attained.) Since all completed forms are processed daily, and the printout of results posted, it is possible for students to take tests one day and see the results the next day. Papers and other hand scored materials require slightly longer.

At the end of each week all of the cards generated from the daily runs are processed again in order to update each student's cumulative record. At the beginning of the following week each student is provided with a printout which shows how many hours he is registered for at the beginning of the semester, the merit equivalent (the number of semester hours multiplied by forty), the number of merits completed in previous semesters, the number of merits completed during the current semester, and which packages he attempted and passed, which he attempted but did not pass, and which he attempted for a second, third, or fourth time.

Both students and faculty have come to rely heavily upon the weekly printout. Students use the printout primarily as an official record of their progress. It is when the student and advisor sit down each week and go over the printout, however, that its real worth becomes apparent. By seeing which packages the student attempted and either passed or failed the advisor is able to detect any emerging pattern which can be altered to facilitate the student's learning progress. If, for example, the

printout showed that a student consistently failed to demonstrate a competence on his first attempt but succeeded on his second attempt, the student would be cautioned against bypassing any of the required learning activities. (To reduce such occurences students must obtain written permission to attempt a package more than twice.) Advisors can also determine whether a student is avoiding certain kinds of packages (such as those requiring written work or those requiring him to teach simulated lessons) and if so, whether special arrangement are necessary to help the student overcome his difficulties.

A unique benefit of the weekly printout is that it makes it possible to immediately determine when a student simply stops working. In many cases a cessation of academic progress indicates that the student is reassessing his decision to become a teacher. While in a traditional setting it is likely that such a cessation would pass unnoticed, the evidence on the weekly printout makes it possbile for the student's advisor to call him in and to offer professional advice.

The fact that students and faculty can sit down on a one-to-one basis and discuss the student's progress using an unbiased computer printout as a basis for their discussions, has had a positive effect on both students and faculty. Students are able to discuss particular problems immediately upon discovering them, are able to receive immediate help and advice, and can be given continual positive reinforcement on the basis of work successfully completed. Advisors get to know each of their advisees on a more personal basis than was possible in the traditional program and are more able to tailor assistance to the needs of each individual student. The weekly printout has proven to be one of the central supports of the Professional Sequence program. Without it the program would be seriously weakened.

The Surveillance system facilitates grade reporting by enabling each advisor to complete grade cards using the data provided on the printout generated for each

to complete grade cards using the data provided on the printout generated for each student during the last week of the grading period. Beginning in February we will dispense with grade cards entirely and simply give students credit for the number of semester hours they actually complete by transferring this data from the Surveillance system tape to the official registration tape, and updating the registration tape where necessary.

Another facet of the Surveillance system is the associated series analysis programs. The most important of these programs provides data concerning how many times each package was passed and failed, the average number of hours students spent completing each package, and the average ratings students gave each of the learning activities in each package. This data is presented to the faculty and is the basis upon which decisions are made to rewrite packages and to revise both learning activities and merit weights.

Other programs provide data concerning how many advisees are assigned to each advisor (thus helping to prevent overloads), which students have completed all packages required prior to Student Teaching (thus helping to avoid last minute rushes), the number of students representing each academic area (thus aiding in the detection of area overloads), and similar administrative data.

There is little doubt that without the extensive utilization of computers the Professional Sequence would have great difficulty existing as a viable program. The high degree of self-pacing allowed students would be impossible without computers and there would be virtually no way for accurate records to be kept on the learning progress of each of the almost 2000 Sequence students without computer help. The Age of Technology and the Age of Increased Learning Freedom are rapidly becoming one-in-the-same at Illinois State University.